Occurrence of the Cephalaspid *Philine sinuata* (Stimpson) in Southern New England, with a Discussion of the Species

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(8 Text figures)

Philine sinuata is a minute tectibranch species described by William Stimpson (1850) on several specimens dredged in shallow water from Boston Harbor, Massachusetts. Although not figured in the original description, a drawing of the shell was included in a subsequent publication (Stimpson, 1851) and this figure was copied by Gould & Binney (1870). Although this species may be fairly common in New England, there has been no further published information on its biology or occurrence in North America. The purpose of this brief report is to note the occurrence of *P. sinuata* in southern New England and to present further information regarding its morphology and taxonomy. These observations are based on animals collected during the summer of 1968 from a location near the mouth of the Mystic River at Noank, Connecticut (Fishers Island Sound). Further observations and measurements were made on several lots of specimens collected by William Clapp from the area of Duxbury, Massachusetts. In this regard, the authors wish to acknowledge the generosity of Dr. Joseph Rosewater who provided us with the available collections on deposit at the United States National Museum.

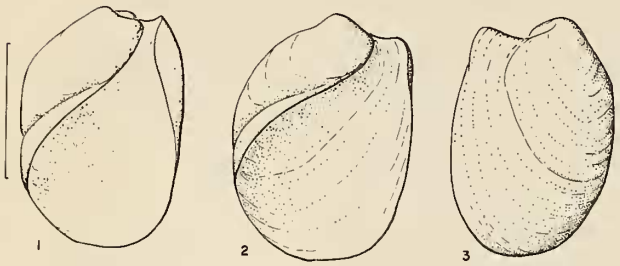
ECOLOGY

Like all philines, *Philine sinuata* is an infaunal species. The Connecticut animals were collected from a shallow sublittoral station at a depth of about 3 m and a salinity of from 29 - 30‰. Three of the four animals were picked off the surface of the sediment by one of us using SCUBA gear. The fourth specimen was taken with a Peterson Grab. The occurrence of these animals on the surface of the sediment may be correlated with oviposition since at the time of collection (July) egg masses were present. The sediment at this station is composed of sand with a high silt/clay content. Eel Grass (*Zostera marina* Linnaeus, 1758) is the dominant organism. The specimens examined from Duxbury, Massachusetts were apparently collected from tidal flats but one lot came from "Eel Grass Roots".

SHELL

The shell is minute. The range in maximum length and breadth is 1.0 - 1.86 mm and 0.74 - 1.40 mm respectively. The majority of specimens is shiny and pellucid although some have a chalky, opaque shell. The shell is ovate with a broad mouth, with maximum breadth near the middle of the shell. The average ratio of breadth to length of all shells examined is 0.72. The lip of the aperture does not extend above the apex. The rounded spire is visible or invisible depending on how the shell is oriented to the observer (Figures 1, 2). The sculpture of *Philine sinuata* consists of a series of very fine concentric growth lines of which some are stronger than others. A characteristic of all specimens examined is a prominent growth cessation line most clearly evident from the dorsal surface (Figure 3).

[1] Contribution No. 53 of the Marine Research Laboratory, University of Connecticut.



Philine sinuata Stimpson, 1850

Figure 1

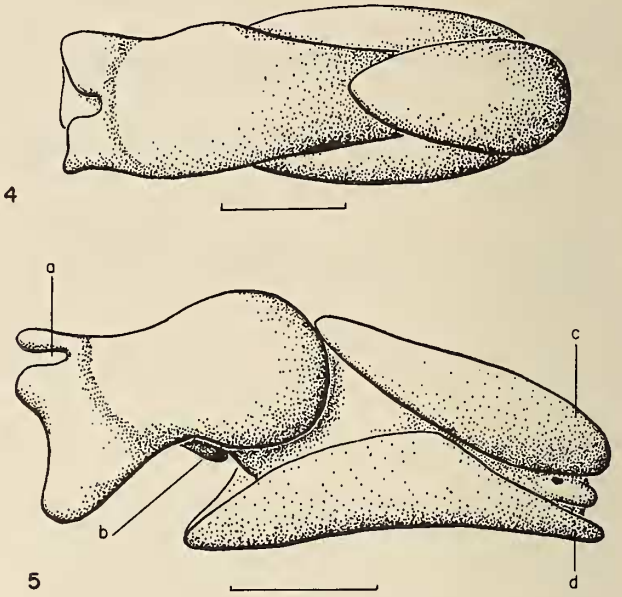
The right side of the shell, as seen in this view, is tilted slightly revealing the spire (Scale = 1 mm)

Figure 2

In this view, the shell has been permitted to assume its normal position on a flat surface (Scale = 1 mm)

Figure 3

Dorsal view of shell showing the spire and the prominent growth cessation line



Philine sinuata Stimpson, 1850

Figure 4

Living animal, dorsal view (Scale = 1 mm)

Figure 5

Living animal, right lateral view (Scale = 1 mm)
a – pallial notch b– gill c – cephalic shield d – foot

ANIMAL

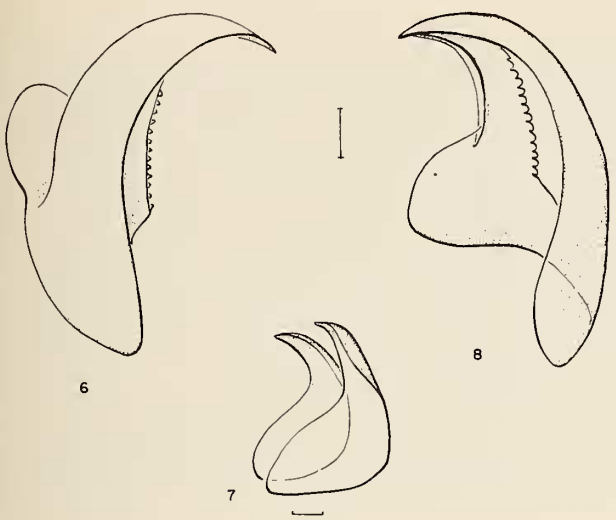
The animal is translucent, yellowish in color with numerous clusters of white pigment spots on the body, head shield and epipodia. The buccal mass is red and is visible externally through the epidermis. In the living animal, the head shield is subtriangular and bluntly pointed posteriorly (Figure 4). This is not evident in preserved slugs. The most characteristic external feature of the species is the finger-like notch located in the midline of the pallial margin posteriorly (Figures 4, 5 a). A deep pallial notch such as this also occurs in *Philine pruinosa* (Clark, 1827).

RADULA

The radula consists of 9 to 16 rows, each with the formula 2·1·0·1·2. An admedian tooth (two views) and a pair of lateral teeth are shown in Figures 6 to 8. The denticles of the admedian teeth extend ventrally almost all the way to the end of the blade. The blade then slants abruptly back to the frontal margin of the tooth. The number of denticles varies from 14 to 25. *Philine sinuata* does not possess jaw plates.

TAXONOMY

An unsuccessful search for the holotype of *Philine sinuata* was made and we assume that it has been lost or destroyed. However, the identity of Massachusetts and Connecticut animals with *P. sinuata* offers no difficulties. The general appearance of the animal is remarkably similar to Stimpson's description. The figure of the shell in Stimpson (1851) indicates a conspicuous, rounded spire and a slight protrusion of the upper lip of the shell. This apparent character led several European workers to an incorrect conclusion as regards the identity of this species with the European *P. denticulata* (Adams, 1800). Upon re-examination of the New England species, it is now obvious that the appearance of the shell with regard both to the spire and the protruding upper lip depends



Radula of *Philine sinuata* STIMPSON, 1850

Figure 6

A – left postero-lateral view of an admedian tooth (Scale = 10μ)

Figure 7

A pair of lateral teeth (Scale = 10 μ)

Figure 8

Right postero-lateral view of an admedian tooth (Scale = 10 μ)

on the orientation of the shell to the observer. When the shell is permitted to assume its natural position, aperture up, on a flat surface, it appears as in Figure 2, i. e., the spire is not visible and the upper lip is acutely rounded. If the outer lip is tilted up slightly, the rounded spire becomes visible and the upper margin of the aperture gives the appearance of being acute or keeled (Figure 1). JEFFREYS (1867) and G. O. SARS (1878), both with some hesitation, considered the European *P. nitida* (JEFFREYS, 1867) to be conspecific with *P. sinuata*. ODHNER (1907) concurred in this opinion. Subsequently, LEMCHE (1948) has shown that *P. nitida* is identical with the older *P. denticulata* (ADAMS). It is now evident that these earlier workers were incorrect in assigning *P. sinuata* as a synonym of *P. nitida* (= *P. denticulata*). *Philine denticulata* is now well known (LEMCHE, 1948; HORIKOSHI, 1967) and has, in addition to an acute and keeled apertural lip, a radula formula 1·1·0·1·1. Furthermore, it lacks the digital pallial margin of *P. sinuata*.

Philine sinuata shares some of the characteristics of the European *P. ventrosa* (JEFFREYS, 1867). However, in a recent publication LEMCHE (1967) has shown that *P. ventrosa* (JEFFREYS, 1867) (= *P. velutinoides* (G. O. SARS, 1878)) must be referred to an entirely new genus, *Rhinodiaphana*. Consequently, *P. sinuata* cannot be confused with any European species. The American species *P. amabilis* (VERRILL, 1880) is also a smooth shelled species but has calcareous gastric plates as well as a 1·1·0·1·1 formula. *Philine tincta* (VERRILL, 1882) is another smooth shelled American species but is inadequately described and has never been rediscovered.

To the best of our knowledge, *Philine sinuata* is known only from Maine, Massachusetts and Connecticut – a remarkably restricted distribution. However, if its association with Eel Grass is characteristic, this species may prove to be more widespread than indicated by its presently known distribution.

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